MAJOR INTERNAL PARASITES AFFECTING HORSES AND OTHER EQUIDS

Jennie L. Ivey, PhD, PAS, Assistant Professor
Lew Strickland, DVM, MS, DACT, Assistant Professor
Holly Evans, Animal Science Intern

Department of Animal Science

Parasite management is essential to maintaining the health and well-being of the horse and other equids. In general, parasites are organisms that form a relationship with the horse that is harmful to the horse while beneficial to the parasite. Horses and other equids can serve as a host to a variety of internal parasites, including small strongyles, large strongyles, bots, tapeworms, roundworms and pinworms. Identifying signs of parasite infestation, along with developing treatment and management plans both for horses and for farms, are essential to equine health programs.

SIGNS AND SYMPTOMS

Internal parasites tend to cause the same generalized clinical signs, including poor body condition, enlarged abdomen, slow growth rate, weakness, decreased digestive ability and an overall poor appearance. Severity of signs is dependent on the intensity of the internal parasite load. Equines with a moderate to heavy parasite load may display anemia, systemic inflammation, organ scarring, bleeding and colic-like symptoms. In extreme cases, internal parasite infestation can lead to death. It is vital to have an understanding of internal parasites to effectively and economically control parasite loads in your herd and at your facility.

LIFE CYCLE

Most internal parasites share similar life cycles. The infective life cycle begins when eggs are ingested by the horse from the environment. Once ingested, the eggs then move into the gastrointestinal tract. Eggs develop into larvae within the intestines or mature to adulthood within the body (dependent upon species). Parasites and eggs leave the body through manure, and the cycle begins again. Some parasites stray from this pattern, and differences are noted below with respect to species.

INTERNAL PARASITES AFFECTING EQUIDS

Small Strongyles — cyathostomes

Image 1: *Small strongyles passed in manure. Image credit Aly Chapman, The University of Tennessee.*

Small strongyles are rapidly becoming a threat in the equine industry through resistance to anthelmintics, or deworming medications. With more than 50 different species within the small strongyle classification, this group accounts for over 90 percent of the total internal parasite population of the horse (Image 1). Small strongyles take refuge in the cecum and colon of the horse where they burrow into the lining of the large intestine, leaving the tissue scarred and inflamed. Small strongyles then encyst, or form a protective capsule, to protect themselves from the horse's immune system. This mechanism allows for the parasite to remain dormant in the walls of the intestine for months to years while producing eggs that are passed on to the environment through manure. The small strongyles' unique preservation mechanism presents a management challenge when attempting to eradicate the parasites from the animal.

Large Strongyles – Strongylus spp.

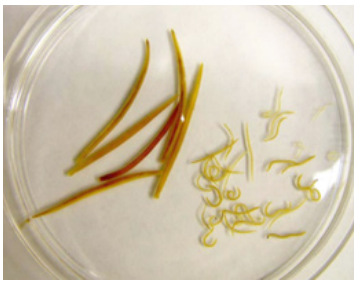

Image 2: *Large strongyles (left) compared to small strongyles (right). Image credit Aly Chapman, The University of Tennessee.*

Large strongyles, otherwise known as bloodworms, are larger in size than small strongyles (Image 2). Bloodworms enter the body after developing within the environment from eggs to the third larval, or infective stage. After the third larval stage is consumed by the horse, the parasite migrates through arteries of the small and large intestine, which leads to arterial damage, blockage and rupture. Even small populations of large strongyles can impair a horse's development and performance, and large loads can result in low body weight, anemia and death due to aneurysms or blood clots in major arteries. Unfortunately, no immunity develops against this particular parasite as the horse ages, so it is important to consider the large strongyle when developing an internal parasite management plan.

Bots/Bot Flies – Gasterophilis spp.

Image 3: *Bot fly eggs on a horse's leg. Image credit Holly Evans, The University of Tennessee.*

Interestingly, bot flies are insects that use horses as a host for reproduction. As such, the eight species of bot flies can each be classified as both an internal and external parasite that affects equines. However, their greatest impact on equine health occurs after bot eggs have entered the body. Bot flies first lay their eggs on a horse's body, typically on the legs, belly and jawline. The off-white to yellow-colored eggs are typically easy to see and should be removed with a bot knife (Image 3). The horse reacts to the flies by biting or licking at the areas where the eggs have been laid, often ingesting the eggs as a result. Once inside the gastrointestinal tract, the eggs attach to the stomach wall where they develop into mature larvae and are expelled from the body in the manure. Bot infestations can have varying effects on the horse, including difficulty swallowing, ulcers, intestinal obstructions and other digestive disorders.

Tapeworms (Cestodes) – Anoplocephala spp.

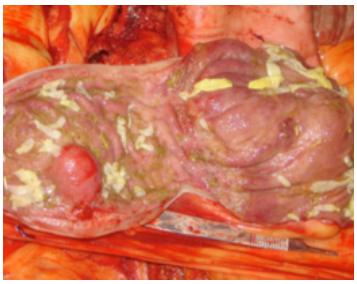

Image 4: *Tapeworm infestation at the ileocecal junction. Image credit Jennie Ivey, The University of Tennessee.*

Tapeworms are a common internal parasite among companion and livestock animals, especially horses of any age. Tapeworms generally prefer areas with temperate climates, which is typical for most of the Southeast. Differing from other previously discussed internal parasites, tapeworms use mites, which horses normally ingest while grazing, as an intermediate host. The mites contain tapeworm eggs, which hatch into larvae within the horse's body. Tapeworm larvae then attach and mature into adults at the ileocecal junction, the portion of the horse's digestive tract where the small and large intestines meet (Image 4). Adult worms will then shed fertilized segments or eggs, which pass through the remainder of the digestive tract into the manure. Signs displayed by horses with tapeworm infestations can vary depending on the parasite load. Effects of tapeworms can include ulcers, swelling of the digestive tract, decreased digestive function and colic.

Roundworms (Ascarids) – *Parascaris equorum*

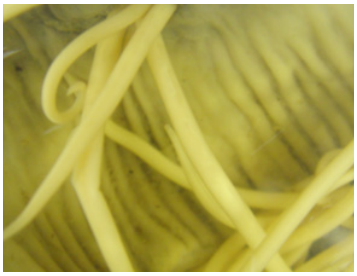

Image 5: *Ascarid intestinal perforation in a foal. Image credit Aly Chapman, The University of Tennessee.*

Roundworms are a common and very problematic parasite for young and growing horses. These worms utilize nutrients from the blood, which leads to unthriftiness and reduced growth rate of the young animal. Roundworms can cause major organ damage and scarring while traveling throughout the body via the circulatory system. Worms leave the gastrointestinal tract and invade the lungs, heart and liver, causing a rough hair coat, coughing, nasal discharge, weight loss, depression, internal inflammation and scarring. Owners must take caution when treating horses for roundworms because the death of the parasite can result in intestinal blockages and impaction colic, release of toxic substances, and subsequent death of the animal.

Pinworms – *Oxyuris equi* and *Probstmayria vivipara*

Image 6: *Tail rubbing is often and indicator of pinworm infestation. Image credit Kentucky Equine Research.*

Pinworms are often the most easily identifiable parasite for the equine owner. Infestation is often characterized by hair loss on the tail as the horse rubs its tail head as a result of the irritation caused by the pinworm (Image 6). Adult worms live in the cecum and colon of the horse's digestive tract. Fertilized female worms lay eggs around the anus of the animal, which leads to irritation and pruritus, or severe itching of the skin, around the tail and rectum. Eggs fall to the ground and are ingested by the horse through consumption of food or water, the inquisitive nature of the horse in its environment, or mutual grooming behavior. Additional effects of pinworms are relatively minor and typically do not have any disease-causing effects in infected horses.

Lung Worms — *Dictyocaulus arnfieldi*

Lung worms are small, thread-like worms that typically live in donkeys, the parasite's natural host. Horses living with infected donkeys are at risk for parasite infestation. When ingested, lung worm larvae migrate through the horse's body to the lungs where they mature into adult worms. This process can take two to four months. Natural mucus production allows for lung worm eggs to move to the throat to be swallowed. Eggs then move through the gastrointestinal tract and are passed in the manure. Coughing, respiratory irritation, bronchitis and pneumonia are the result when worms persist in the lungs.

Threadworms – *Strongyloides westeri*

Threadworms are common in horses younger than 6 months of age and, therefore, should be considered when developing a foal management plan. Foals ingest infective larvae through the dam's milk when nursing. Those larvae then migrate to the small intestine, where they develop into adult worms and eventually pass out of the horse in the manure. Threadworms can cause diarrhea in infected foals, which should be monitored closely for loose bowel movements.

TREATMENT AND MANAGEMENT

Over the last several centuries it has become common practice to deworm horses four to six times a year or to use rotational-routine deworming protocols. This practice has increased the rate of parasite anthelmintic resistance. Therefore, this technique is not recommended and is no longer a viable option for internal parasite prevention.

Dewormers, or anthelmintics, act by killing vulnerable parasites in the body, but they are not able to kill those that are resistant to the drug. These resistant parasites persist and produce resistant offspring to create a new population that is dominated by resistant parasites. When it is time to treat again, the drug(s) will not be as effective in eradicating the problem or reducing the overall parasite load in these resistant populations.

Randomly selecting anthelmintics to administer to horses, or blindly treating horses for parasite loads, is not recommended. Instead, determining which parasites a horse is harboring and the magnitude of parasite load should dictate the management plan. Current deworming recommendations include performing a fecal egg count, or FEC for short, to determine the horse's parasite load and shedding level. This test, which is very quick and affordable, provides valuable information on which parasites to target. After an FEC is performed, you and/or your veterinarian will be able to determine a management plan that is specific to the type of internal parasites and the amount of eggs the horse is actively shedding (Table 1).

Table 1. *Projected shedding level for number of parasite eggs per gram of manure.*

Shedding Level	Number of Parasite Eggs Per Gram of Manure
Low	Less than 200
Moderate	200 to 500
High	More than 500

Selecting a dewormer that will target the specific parasites within the horse is important to reduce parasite load. Certain drug classes may be effective against many, or only a few parasites, so it is important to understand which drug classes are effective against each parasite (Table 2). A typical plan may include combining the use of anthelmintics with FEC results, then deworming against the present parasites and retesting with another FEC two weeks later (also known as a fecal egg count reduction test). Ideally, a 90 percent reduction in FEC from the previous test is considered to be an effective deworming administration. If there is not a reduction, then it is safe to assume the parasites have developed a resistance to that particular class of deworming drug. The price of performing fecal egg counts is similar to the cost of rotational deworming protocols. However, the FEC is much more effective at targeting specific parasite species, thus reducing parasite load while minimizing the development of resistance.

Additionally, administering an incorrect dosage can also increase resistance development. It is important to read the product label before administering any deworming product and have an accurate weight estimation for the horse to ensure proper dosing. For more information on how to determine a horse's body weight, please reference UT Extension Publication "SP 795 Equine Welfare Series: Evaluating Your Horse's Body Weight and Condition."

Table 2. *Anthelmintic categories and targeted parasites. UT Extension Publication PB 1841, "The Tennessee Master Horse Program Manual."*

Drug Category	Drug Name	Targeted Parasite(s)	Known Resistance
Benzimidazoles	Fenbendazole Oxfendazole Oxibendazole	Ascarids Strongyles Pinworms Threadworms	Small Strongyles
Tetrahydropyrimidines	Pyrantel pamoate Pyrantel tartrate	Ascarids Small Strongyles Tapeworms	Ascarids Small Strongyles
Macrocyclic Lactones	Ivermectin Moxidectin	Ascarids Strongyles Threadworms Lungworms Bots Pinworms	Ascarids
Isoquinolene-pyrozines	Praziquantel	Tapeworms	
Heterocyclic compounds	Piperazine	Ascarids Small Strongyles	Small Strongyles

Refugia

Refugia can be defined as a group of parasites not exposed to an anthelmintic, and thus left untreated. This untreated group is less likely to develop resistance to deworming drugs based on decreased exposure. The majority of parasites will then be susceptible to anthelmintics, rather than large numbers of parasites that are resistant to all available treatments. The goal of refugia within a deworming program is to slow parasite resistance, and thus continue to have parasites that are susceptible to the drug classes currently available for control purposes.

PASTURE AND MANURE

Successful management techniques target parasite life cycles in a manner that reduces the total amount of parasite eggs and larvae available for the horse to ingest. Pasture and turn-out time is important for equine health and well-being, but horses commonly come in contact with parasites while grazing. Maintaining an ideal pasture stocking rate is critical for parasite management. Ideally, 2-3 acres should be allotted per horse for exercise and nutritional purposes. Higher stocking rates can lead to increased parasite exposure due to overgrazing. Stocking rates of 1 acre or less per horse limits the horse's ability to exercise and to obtain enough nutrients from the available forage, along with increasing the amount of manure within the area.

Manure is the primary way that parasites are transmitted from one horse to another. Regular removal of manure from pastures, turn-out areas or other areas where horses frequent is an effective means of reducing exposure to parasites. Additionally, using good pasture management to keep grasses between 3 and 4 inches high at a minimum will decrease parasite ingestion, as most parasites cannot "climb" up plants in pasture. This may be accomplished through rotational grazing or controlled management of continuous grazing systems. Grazing other species within horse fields may aid in parasite control, as many internal parasites are species-specific and cannot complete the life cycle if consumed by another animal. Dragging or harrowing pastures to break up manure piles can expose parasite eggs to heat during certain times of the year when the ambient temperature will reach above 85 degrees Fahrenheit for the majority of the day. Do not drag pastures while horses are actively grazing, and allow at least two weeks of rest between dragging and reintroducing horses to the pasture. These management practices are important to allow parasite eggs and larvae to die off before horses return to grazing the pasture.

Composting is also an effective method for reducing parasite load and creating a usable product from manure and other equine waste. As the compost pile reaches a temperature that exceeds 160 degrees Fahrenheit, the temperature required for organic decomposition, parasite eggs and larvae are destroyed.

CONCLUSIONS

Internal parasites can be harmful to the health of horses and, in certain circumstances, result in death. Routine fecal egg counts, fecal egg count reduction tests, pasture rotation and manure management are all integral components of an effective deworming program, as is selecting the correct deworming drug to target the parasite species of interest. With proper planning, the risk of parasite exposure can be minimized, therefore improving the health of horses. Contact your county Extension agent for more information or assistance in developing an internal parasite prevention program.

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